CHAPTER 10
RISK CHARACTERIZATION

10-1. Introduction. This chapter discusses the project team responsibilities as a part of the risk characterization during the EE/CA phase of an OE response action. The project team conducts risk characterizations of OE sites to evaluate the proposed removal alternatives and prioritize among different sites or different areas of the same site. The objective of the project team during the risk characterization process is to estimate the potential for exposure to OE at a site or a portion of a site prior to a removal action. Attachment 10-1 presents a checklist for the project team to follow when planning a risk characterization approach for inclusion in a SOW.

10-2. Data Quality Objectives. The project team should consider data quality objectives for risk characterization regarding:

a. Statistical validation of the sampling approach;

b. Prioritization of the site or sectors of the site for OE removal; and

c. Documentation of the risk characterization for future use in the ESS and other project documents.

10-3. Total Assessment Strategy. Total Assessment Strategy is a framework in which to apply all risk tools. Total Assessment Strategy provides a holistic approach to an OE response project by examining all factors that contribute to the OE problem at the site. It includes a methodical assessment of community problems resulting from ordnance contamination and the potential benefits of a response action undertaken by the federal government, with support of the community (i.e., local residents, local officials, state and federal regulators). Following this assessment, the potential for harm and the level of protectiveness at the site may be determined. Total Assessment Strategy implements functional planning into the OE Program through project justification (e.g., why is the existing condition unacceptable and what is the future without the project) and alternatives development to remedy those problems. For additional information on Total Assessment Strategy, contact the OE MCX.

10-4. Selection of Risk Characterization Tools.

a. Prior to the development of the SOW, the project team should determine which risk characterization tool would be used during the site characterization process. The project team may select either a qualitative or quantitative risk characterization tool to assess risk.

b. Factors to Consider. To select the appropriate risk characterization tool, the project team should consider the following:

(1) Purpose of the response action;

(2) Level of risk acceptability at the site;

(3) Qualitative versus quantitative risk characterization approach;

(4) Amount of the site which needs to be sampled;

(5) Methodology which should be used to determine how much of the site should be sampled;

(6) Compatibility of the selected methodology with the technology that will be used during the project;

(7) Project budget;

(8) Political sensitivity of the project;

(9) Statistical confidence required;

(10) Availability of site-specific information;

(11) Use of geophysical data for anomaly selection;

(12) Use of homogeneous sectors; and

(13) Extent of UXO contamination.

c. Sources of Information. When considering the above factors for the selection of a risk characterization tool, the project team may consult the following sources of information:

(1) ASR;

(2) Previous site investigation reports;

(3) Interviews with local personnel; and

(4) Field observations from the site visit.

10-5. Qualitative Tools. The project team may use a qualitative risk tool to make determinations of the types of risk that exist at areas within a potentially OE contaminated site. A qualitative tool generates a numeric score as the result of a series of general questions on the nature of OE contamination at the site. An example of a qualitative risk tool is the Risk Assessment Code. The Risk Assessment Code (RAC) is a numeric score derived from the completion of a RAC

worksheet, which presents a series of general questions on the nature of OE contamination at the site. An example of a RAC worksheet is presented in EP 1110-1-18. The results of the RAC evaluation are used to prioritize response actions for OE contaminated sites.

a. Use of the RAC. The RAC is used during the PAE and SI phases of the OE response process. During the PAE phase, the RAC is completed by the district and included in the INPR. The RAC is required for all INPRs, including sites with a decision of No DOD Action Indicated (NDAI), thus providing a permanent record to meet the congressional intent that a conscientious effort has been made to determine the presence or absence of ordnance. During the SI phase, the RAC is re-evaluated and included as a part of the ASR.

b Sources of Information to Support the RAC. The information for the RAC is derived from the following sources:

(1) Information from records searches;

(2) Reports from explosive ordnance disposal units;

(3) Local law enforcement agencies;

(4) Interviews; and

(5) Field observations from the PAE of eligibility phase.

c. RAC Determination. The RAC is derived from a worksheet composed of checklists that are used by the project team to determine the following:

(1) Types of UXO;

(2) Amount of UXO; and

(3) Proximity of the public to the UXO.

d. RAC Results. Following the completion of the RAC worksheet, a value is determined for several subsets of data and added together to derive a RAC score.

10-6. Quantitative Tools. Quantitative tools are available for the project team to use during an OE response project. The project team should contact the OE MCX for guidance on the selection of the proper quantitative tool. An example of a quantitative risk tool is the Ordnance and Explosives Cost Estimating Risk Tool (OE*Cert*). OE*Cert* is a prioritization tool developed by USAESCH to determine the risk at an OE contaminated site both before a removal action and after the proposed removal alternatives have been implemented. OE*Cert* can be used to cost out the removal alternatives and prioritize among different sites as well as among different areas at

the same site. This tool is also helpful in the comparison of removal alternatives based on cost and associated risk reduction. Additional information about OE*Cert* may be found in CEHNC 1115-3-86, Ordnance and Explosives Cost Estimating Risk Tool Standing Operating Procedures.

10-7. Statistical Tools.

a. General. The project team may select a statistical tool to examine the density of UXO at a site or a portion of a site. Examples of statistical tools available to the project team include SiteStats/GridStats and the UXO Calculator. The project team should consider a statistical tool under the follow circumstances:

(1) An adequate budget is available to allow for intrusive effort to characterize the anomalies;

(2) The examined areas of the site should be divided into homogeneous sectors; and

(3) Information on future land use, population and UXO density is available.

b. SiteStats/GridStats.

(1) General. SiteStats/GridStats is used to statistically characterize sites/grids through the use of a percentage of anomalies at a site/grid. It estimates the number of ordnance items at a site/grid in a logical, mathematically precise, repeatable manner. Using SiteStats/GridStats is considerably cheaper than investigating all anomalies at a site/grid.

(2) Considerations for Use. If SiteStats/GridStats is selected as the risk characterization tool, the project team should make the follow determinations:

(a) How will the site be divided into homogeneous sectors?

(b) What is the most probable number of grids needed to characterize a sector?

(c) How will the grids be allocated across the site?

(d) Will the grids be selected by the computer program or manually?

(e) What grid dimensions will be used?

(3) Project Team Responsibilities. When GridStats/SiteStats is used during an OE project, the project team should ensure the following responsibilities are fulfilled:

(a) The government provides a copy of GridStats/SiteStats and the program user manual to the OE investigation contractor;

(b) The OE investigation contractor has a hard copy of the random sequence of investigation that is chosen for each grid;

(c) The contractor uses an appropriate method of communication to report the results;

(d) A manual log and hard copy of the SiteStats/GridStats results for each grid is provided with the draft OE investigation report; and

(e) The Site/Grid Statistical Sampling Based Methodology (SiteStats/GridStats) Standing Operating Procedure found in CEHNC 1115-3-85, November 1996, is followed.

c. UXO Calculator. The UXO Calculator is a statistical model for determining the amount of UXO in a sector.

(1) Considerations for Use. To select the UXO Calculator, the project team should consider the following aspects of the tool:

(a) Used during the EE/CA phase of a response action;

(b) Requires 100 percent of geophysically picked anomalies in a grid to be investigated; and

(c) Used to develop statistical confidence intervals for UXO density and to perform statistical tests concerning UXO densities.

(2) Project Team Responsibilities. When the UXO Calculator is selected as the risk characterization tool, the project team is responsible for the following:

(a) Determining the sectors, the size of each sector, and the target density for each sector;

(b) Ensuring that the sectors are homogenous (i.e., equal likelihood of UXO across the sector);

(c) Ensuring that the sectors are contiguous, have the same future land use and (possibly) the same past land use;

(d) Ensuring that mathematical procedures for determining sectorization are approved by USAESCH; and

(e) Ensuring that the Standing Operating Procedure for the UXO Calculator is being followed.

10-8. Risk Characterization Report. Following the risk analysis, the project team should review and approve the risk characterization report. This report should present the following:

a. Description of the proof of sectors;

b. Discussion of the density range;

c. Discussion of qualitative factors, such as what was looked for and what was found;

d. Discussion on the use of the report to make removal action decisions; and

e. Limitations of the method to obtain quantitative data.

ATTACHMENT 10-1
RISK CHARACTERIZATION CHECKLIST

Project Name: _____
Project Location: _____
Design Center POC: _____
Preparer's Name and Title: _____
Date of Preparation: _____

	Y	N	N/A
SOW Development Considerations for Risk Characterization			
1. Has the level of risk acceptability for the OE site been defined?	_____	_____	_____
2. How much of the site needs to be sampled?	_____	_____	_____
3. Which approach is most appropriate for this project:			
• Qualitative risk characterization?	_____	_____	_____
• Quantitative risk characterization?	_____	_____	_____
4. Is the selected methodology compatible with the technology that will be used during the project?	_____	_____	_____
Selection of Risk Characterization Tools			
1. Has the project team considered the following factors:			
• Purpose of the response action?	_____	_____	_____
• Level of risk acceptability at the site?	_____	_____	_____
• Qualitative versus quantitative risk characterization approach?	_____	_____	_____
• Amount of the site which needs to be sampled?	_____	_____	_____
• Methodology which should be used to determine how much of the site should be sampled?	_____	_____	_____

	Y	N	N/A
• Compatibility of the selected methodology with the technology that will be used during the project?	_____	_____	_____
• Project budget?	_____	_____	_____
• Political sensitivity of the project?	_____	_____	_____
• Statistical confidence required?	_____	_____	_____
• Use of geophysical data for anomaly selection?	_____	_____	_____
• Use of homogeneous sectors?	_____	_____	_____
• Extent of UXO contamination?	_____	_____	_____

Selection of Qualitative Risk Characterization Tools

1. If the RAC will be used as a risk characterization tool, has the project team considered the following:

• Types of UXO?	_____	_____	_____
• Amount of UXO?	_____	_____	_____
• Proximity of the public to UXO?	_____	_____	_____

Selection of Quantitative Risk Characterization Tools

1. Has the project team considered the use of OE*Cert*? _____ _____ _____

Selection of Statistical Tools

1. Has the project team confirmed the following:

• Geophysical data will be used to discriminate anomalies?	_____	_____	_____
• Adequate budget is available to allow for intrusive effort to characterize the anomalies?	_____	_____	_____
• The examined areas of the site will be divided into homogeneous sectors?	_____	_____	_____
• Information on future land use, population and UXO density is available?	_____	_____	_____

	Y	N	N/A
2. If the project team is considering SiteStats/GridStats, have the following determinations been made:			
• How will the site be divided into homogeneous sectors?	_____	_____	_____
• What is the most probable number of grids needed to characterize a sector?	_____	_____	_____
• How will the grids be allocated across the site?	_____	_____	_____
• Will the grids be selected by the computer program or manually?	_____	_____	_____
• What grid dimensions will be used?	_____	_____	_____
3. If SiteStats/GridStats is selected, have the following been completed:			
• Has the government provided a copy of GridStats/SiteStats and the program's user manual to the OE investigation contractor?	_____	_____	_____
• Has the OE investigation contractor received hard copy of the random sequence of investigation that is chosen for each grid?	_____	_____	_____
• Has the contractor used an appropriate method of communication to report the results?	_____	_____	_____
• Has the project team received a manual log and hard copy of the SiteStats/GridStats results for each grid with the draft OE investigation report. Follow the Site/Grid Statistical Sampling Based Methodology (SiteStats/GridStats) Standing Operating Procedure found in CEHNC 1115-3-85, November 1996.	_____	_____	_____
4. If the project team is considering the use of the UXO Calculator, have the following items been considered:			
• Is the project in the EE/CA phase of a response action?	_____	_____	_____

	Y	N	N/A
• Will 100 percent of geophysically picked anomalies in a grid be investigated?			
• Are statistical confidence intervals for UXO density needed?			
5. If the project team selects the UXO Calculator, have the following been completed:			
• Determination of the sectors, the size of each sector, and the target density for each sector?			
• Determination that the sectors are homogenous (equal likelihood of UXO across the sector)?			
• Determination that the sectors are contiguous, have the same future land use and (possibly) the same past land use?			
• Mathematical procedures for determining sectorization are approved by USAESCH?			
• The Standing Operating Procedure is followed?			
Risk Characterization Report			
1. The project team should ensure that the Risk Characterization Report contains the following:			
• Description of the proof of sectors?			
• Discussion of the density range?			
• Discussion of qualitative factors, such as what was looked for, what was found?			
• Discussion on the use of the report to make removal action decisions?			
• Limitations of the method to obtain quantitative data?			